

UE Advanced Functional Nanomaterials



Level
Baccalaureate
+5



ECTS
3 credits



Component
UFR PhITEM
(physique,
ingénierie, terre,
environnement,
mécanique)



Semester
Automne

- > **Teaching language(s):** English
- > **Open to exchange students:** Yes
- > **Code d'export Apogée:** PAX9NCAL

Presentation

Description

Goal:

To demonstrate the novelty and advances in the field of nanostructured materials and architected coatings for dedicated functions. Their properties and applications especially in the domain of materials for energy and sustainability will be illustrated.

The different aspects of the bottom-up strategy towards nano-objects will be discussed for the fabrication of nanostructured powders and coatings. Processes using a vapor phase such as Chemical Vapor deposition and Atomic Layer Deposition will be presented in details: principles, applications, technological aspects and modelling. Special attention is focused on multimaterials stability through thermodynamics considerations.

Objectives

Contents:

- Fabrication of powders, nanocrystalline ceramics and nanostructured thin films.
- Development of innovating processes : Electrostatic Spray Deposition, Spray-Pyrolysis assisted by ultrasonic atomiser, mecanosynthesis, dynamic compaction techniques, HIP and SPS sintering.

- Specific properties/structure relations (thermodynamical, electrical, catalytic, mechanical properties) of inorganic materials or nanocomposites as powders, ceramics and nanostructured membranes.
- Applications in different high technology domains : energy storage and energy conversion (fuel cells, lithium-ion batteries), environment (catalysis)

Course parts

UE Advanced Functional Nanomaterials - CMTD	Lectures (CM) & Teaching Unit (UE)	16h
UE Advanced Functional Nanomaterials - TP	Practical work (TP)	8h

Recommended prerequisites

Background in thermodynamics, materials science

Period : Semester 9

Useful info

Campus

➤ Grenoble - University campus